Brooding and Reflection Mediate the Association Between Anxiety and Depression

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Abstract

Background: Anxiety has been found to be a strong predictor of depression. Past research has found several commonalities in the comorbidity of anxiety and depression, one of these being rumination, which has been found to be related to the development of psychopathology. The anxiety response styles theory of comorbidity suggests that individuals that have anxiety symptoms and also tend to engage in rumination are more vulnerable to developing depressive symptoms. Two main subcomponents of rumination include reflection and brooding. Although considerable research has been done regarding the association of rumination in the relation of comorbidity, minimal research has included the subcomponent of reflection specifically.

Method: Three-hundred and seventy-five students at a large Midwestern University (M = 19 years) participated in an online questionnaire through Qualtrics and received course credit in exchange for participation.

Results: Anxiety symptoms were positively associated with depressive symptoms, reflection, and brooding independently of one another. It was found that an increase in reflection and an increase in brooding were each independently associated with an increase in depressive symptoms. Results of the analysis confirmed the mediating roles of reflection and brooding in the relation between anxiety and depressive symptoms.

Limitations: This study examines comorbidity and rumination using an undergraduate sample. The sample is relatively low in diversity of age range.

Conclusions: Results support and expand on previous research in that the comorbidity between anxiety and depression is explained in part through facets of rumination, specifically reflection and brooding.

Brooding and Reflection Mediate the Association Between Anxiety and Depression

Considerable research has focused on high comorbidity rates between individuals with symptoms of anxiety and depression (Lamers, van Oppen, Comijs, Smit, & Spinhoven, 2011). Specifically, anxiety has been found to be a strong predictor of depression (Klein Hofmeijer-Sevink, Batelaan, can Megen, Penninx, & Cath, 2012). Aune and Stiles found that individuals that have persistent social anxiety had significantly higher levels of depression during their follow up evaluation 1 year following their diagnosis of anxiety, independent of their initial level of depressive symptoms (2009). It has been found that depressive symptoms are associated with longer recovery periods in patients (Aune et al., 2009; Nolen-Hoeksema, Morrow, & Fredrickson, 1993). Furthermore, research has shown that when these two conditions are comorbid, this results in work impairment, social impairment, and higher suicidality rates (Aderka, Hofmann, Nickerson, Hermesh, & Gilboa-Schechtman et al., 2012; Cougle, Keough, Riccardi, & Sachs-Ericsson, 2009). This suggests that examining mechanisms of comorbidity is an important area of research. However, few studies have directly evaluated mechanisms of comorbidity between these conditions. This is surprising, because research has identified several commonalities between anxiety and depression, including repetitive negative thought (RNT). Therefore, the goal of this project was to document potential mechanisms of comorbidity between anxiety and depression by evaluating specific indices of RNT.

Several theoretical perspectives have outlined how RNT, and particularly rumination, relate to the development of psychopathology. Nolen-Hoeksema (1987) proposed the response styles theory (RST) regarding rumination and its association with psychopathology such as anxiety and depressive symptoms. After multiple studies showing results of women having higher depression rates than men, Nolen-Hoeksema (1987) evaluated why women have these

higher rates of depressive symptoms. After reviewing evidence to understand the differences in depression between genders, the data indicated that women rely more on a coping style called rumination when they are depressed (Nolen-Hoeksema, 1987), which could serve as an explanation for the gender differences in depression (Papageorgiou & Wells, 2003). This means that when women are feeling depressed, they dwell on these negative thoughts, their causes, and their implications. On the other hand, men tend to use a coping style of distraction when they are experiencing depressive symptoms, which does not exacerbate their depressed mood (Nolen-Hoeksema, 1987). This breakthrough proposed the idea that these "gender differences" in regards to the prevalence of depressive symptoms are actually due to the way in which individuals act and respond when experiencing depression, and the coping mechanisms that they utilize. Therefore, this theory has helped advance our knowledge of the role of rumination in the development of psychopathology.

The RST describes two main styles in which individuals respond to their experiences with depression: they either focus inward and repetitively think about the causes and consequences of their depression, labeled as a ruminative style, or they distract themselves from their depressive symptoms, labeled as a distracting style. According to Nolen-Hoeksema's (1987) theory, rumination is a maladaptive response to negative emotions in which the individual repetitively thinks about the meaning, cause, and implications of their negative emotions rather than actively trying to improve their mood and find a solution (Lyubomirsky, Layous, Chancellor, & Nelson, 2015). Instead of attempting to resolve the issue, the individual becomes stuck in a cycle of ruminating and repetitively and consistently engages in it (Lyubomirsky et al., 2015). Although it has been found that rumination is a natural response in many people that is not considered abnormal, some individuals may engage in a great deal of rumination that may

possibly result in a variety of negative consequences (Papageorgiou et al., 2003). According to Lyubomirsky et al. (2015), various studies over the RST have shown that this detrimental form of ruminating exacerbates and prolongs depressive symptoms, which ultimately increases the likelihood of the depressive symptoms becoming chronic. Rumination prolongs depressive symptoms due to four mechanisms stated in the RST. According to Papageorgiou et al. (2003), the first mechanism is that the effect of negative moods on thought processes are enhanced, which ultimately increases the chances that individuals will use their depressive thoughts to understand their current situation. The next mechanism is that effective problem-solving is impaired due to the negativity and pessimistic nature of the thoughts (Papageorgiou et al., 2003). Third, repetitive negative thinking negatively affects instrumental behaviors, actions that are performed in order to reach a desired outcome (Papageorgiou et al., 2003). Lastly, Papageorgiou et al. (2003) state that the fourth mechanism is that chronic ruminators will eventually lose social and community support, which will then worsen their depressive symptoms that were previously present.

There has been an abundance of empirical studies conducted that serve as support for Nolen-Hoeksema's Response Style Theory (Strauss, Munday, McNall, & Wong, 1997). Morrow and Nolen-Hoeksema (1990) found that in a laboratory analogue study, distraction dampened while rumination deepened individual's generalized dissatisfaction with life. Additionally, it has been found that rumination and internal focus serves as a strong correlate of depressive symptoms in individuals (Wood, Saltzberg, Neale, Stone, & Rachmiel, 1990). In addition, other studies have found that there is evidence to suggest that the differences in gender in regards to depressive symptoms may be due to women focusing on their negative mood and the resulting outcomes (Butler & Nolen-Hoeksema, 1994). Multiple studies show support for RST and the

growing literature suggests that women tend to engage in rumination more than men and focus more on their affective state and negative thought processes (Butler & Nolen-Hoeksema, 1994; Conway, Giannopoulos, & Stiefenhofer, 1990). Ingram, Cruet, Johnson, and Wisnicki suggest this may be due to women showing a greater propensity than men to internally direct their attention in response to eliciting events (1988). It also was found that this response style of rumination was significantly associated with depression in the individual (Butler & Nolen-Hoeksema, 1994).

As stated previously, it has been found that individuals that ruminate to more extremes experienced longer and more severe episodes of depressive symptoms than those who do not ruminate (Papageorgiou et al., 2003). Several studies have found that rumination is associated with the development of psychopathology (Ciesla & Roberts, 2002; Flett, Madorsky, Hewitt, & Heisel, 2002; Lyubomirsky & Nolen-Hoeksema, 1995). For example, Nolen-Hoeksema and Morrow (1991) induced participants to either engage in rumination or to distract themselves from this form of RNT. Results found that individuals who were categorized as ruminators previous to the stressor had higher levels of depression ten days and seven weeks after the stressor was induced, despite controlling for prior depression levels. Other studies have found associations with rumination and increased depressive symptoms using several methodologies, including cross-sectional (Steiner, Wagner, Christina, Bigatti, & Storniolo, 2014; Rood, Roelofs, Bogels, Nolen-Hoeksema & Schouten, 2009), prospective (Ito & Agari, 2002; Hankin, B.L. (2008), and experimental methodology (Park, Goodyer, & Teasdale, 2004; Donaldson, Lam, & Mathews, 2007). Therefore, there is considerable support for Nolen-Hoeksema's theory. This research also as spawned more recent theories expanding our knowledge of the role of RNT in the development of psychopathology.

One recent theory based on RST is the anxiety response styles theory of comorbidity (Starr & Stroud, 2015). This framework is based on the hypothesis that individuals respond to anxious thoughts with different cognitive styles, and these different cognitive responses may affect the risk of depression in the individual (Starr & Stroud, 2015). A negative anxiety response style (NARS) occurs when an individual has a tendency to engage in ruminative habits and cognitions about anxiety symptoms (Starr & Davila, 2012). Starr and Stroud (2015) state that these negative anxiety response styles show to what extent individuals respond to their own symptoms of anxiety using various cognitive processes that are linked to depression. The difference between NARS and anxiety sensitivity is that anxiety sensitivity has a fearful component (Reiss, Peterson, Gursky, & McNally, 1986) in the response to anxiety symptoms. On the other hand, instead of fearful, NARS reflects a ruminative and hopeless response to these symptoms (Starr & Stroud, 2015). The anxiety response style theory has found that NARS may increase the chances that anxiety symptoms will lead to depressive symptoms within an individual (Starr & Davila, 2012). In this way, it is possible that NARS could cause a normal experience to be an acutely painful event for an individual due to their experience of anxiety. Experiencing this acute pain may instill negative thoughts within the individual about the future and what possibilities could occur, and this could eventually lead to an increase in depressive symptoms (Starr & Stroud, 2015). Starr and Davila (2012) proposed a new model of the comorbidity of anxiety and depression, with rumination serving as a maladaptive response style. Through this negative response style, anxiety increases depressive symptoms in an individual, which then contributes to the comorbidity of anxiety and depression (Starr & Davila, 2012). The way in which rumination plays a part in the comorbidity of anxiety and depression may take place due to two possibilities. Starr and Davila explain that one possibility is through a mediation

model, in which anxiety symptoms in an individual initiate ruminative responses which in turn increase depressive symptoms (2012). Another possible pathway is through a moderation model, in which the tendency to ruminate when feeling anxious interacts with previous anxious thoughts to lead to depressive symptoms (Starr & Davila, 2012).

Starr's theory (Starr & Stroud, 2015) is developed around the hypothesis that individuals respond to anxious thoughts with different cognitive styles. McGinn (2010) agrees with this finding, supporting the idea that the cognitive processes that an individual uses affects both the development and the maintenance of various forms of psychopathology. Modifying these response styles and cognitive processes could potentially have a significant impact on the improvement of psychopathology. Starr and Davila (2012) state that NARS increases the likelihood that anxiety symptoms will lead to increased symptoms of depression. The findings of Stein et al. (2001) found similar results, showing that anxiety disorders during adolescence or young adulthood is a strong predictor of depressive disorders later in life. Coinciding with Starr and Davila's (2012) mediation model hypothesis, in which anxiety symptoms in an individual initiate ruminative responses, which in turn increase depressive symptoms, a recent study found that rumination mediated the longitudinal relationship between symptoms of anxiety and symptoms of depression in individuals (Michl, McLaughlin, Sherpherd, & Nolen-Hoeksema, 2013).

More recent theoretical perspectives have drawn on this work in outlining how rumination may play a role in the high levels of comorbidity between anxiety and depression (Verstraeten, Bijttebier, Vasey, & Raes, 2011; McLaughlin & Nolen-Hoeksema, 2011). For example, Starr and Davila (2011) conducted three studies proposing that anxiety response styles such as rumination and hopelessness increase depressive symptoms, exemplifying the

comorbidity between anxiety and depressive symptoms. The results had three main findings: 1) when rumination was controlled for there was a significant decrease in the association between anxiety and depression, 2) anxiety paired with rumination predicted increased depressive symptoms, and 3) rumination moderated the association between anxiety and depression (Starr & Davila, 2011). These three results show support for the role of rumination in the comorbidity between anxiety and depression. Other studies have found associations with rumination and comorbidity between anxiety and depression using several methodologies, including cross-sectional (McEvoy, Watson, Watkins, & Nathan, 2013; Spinhoven, Drost, van Hemert, & Penninx, 2015), prospective (Drost, van der Does, van Hemert, Penninx, & Spinhoven, 2014; McLaughlin &Nolen-Hoeksema, 2011; Grant, Judah, Mills, Lechner, Davidson, & Wingate, 2014), and experimental methodology (Roelofs, Huibers, Peeters, & Arntz, 2008). Therefore, there is considerable support for Starr's theory as well.

Therefore, there is strong evidence that rumination may be one mechanism for the development of comorbid anxiety and depressive symptoms. However, there is still additional work needed to advance our understanding of how rumination serves as a mediator for the high levels of comorbidity between anxiety and depression. In the current study, we will be assessing rumination using the Ruminative Response Scale (RRS; Nolen-Hoeksema & Marrow, 1991; Treynor, Gonzalez, & Nolen-Hoeksema, 2003). This measure uses two subscales: the Reflection factor and the Brooding factor, which are two subcomponents of rumination. Reflection involves an individual looking inward and engaging in attempts to problem solve in order to decrease depressive symptoms while brooding has a negative aspect where the individual compares the current situation to unachieved standards (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Although brooding and reflection are both subcomponents of rumination, few studies have

evaluated reflection's role in comorbidity. It has been found that there is a pattern that suggests that brooding is a more maladaptive factor, more related to cognitive biases, and has a stronger association between negative cognitive styles and depression ((Treynor et al., 2003; Joormann, Dkane, & Gotlib, 2006; Lo, Ho, & Hollon, 2008) compared to reflection. Burwell and Shirk (2007) found similar results where brooding was associated with maladaptive coping mechanisms whereas reflection was associated with mostly adaptive coping mechanisms. Due to these previous findings, minimal research has included the role of reflection in the comorbidity of anxiety and depressive symptoms despite the more recent widely accepted belief of the strong association of both subcomponents in depressive rumination. The two-factor structure of reflection-brooding has become widely known and used within the scientific community, but there is little empirical evidence of this two-factor structure in relation to comorbidity (Schoofs, Hermans, & Raes, 2010).

The majority of studies assessing mediation have used older methodologies with several limitations. These limitations include relying on analytical formulas, using distributional assumptions to make inferences about population parameters, only being valid asymptotically, and making unrealistic assumptions about populations to make inferences (Dogan, 2007). In the current study, we used the Hayes Macro PROCESS methodology, which uses a framework for estimating effects of various mediator models, moderation, and conditional process analysis. To infer about indirect effects, bootstrap and Monte Carlo confidence intervals are implemented in this newer methodology (Efron, 1979). The bootstrapping method was introduced in the 1970's (Efron, 1979) and has become well known and fairly popular in the research area. A main goal of research is to make inferences about a population parameter based on probability using an estimator and a sample (Dogan, 2007). Bootstrapping is a nonparametric technique used to make

these inferences, and the main idea behind it is the process of resampling. Essentially, bootstrapping resamples the data many times in order to obtain an estimate of the entire sampling distribution, called subsampling (Camerer, 1981). Compared to older methodologies that used distributional assumptions and formulas, bootstrapping uses computations that are large and repetitive in order to estimate the shape of the sampling distribution (Dogan, 2007). The advantage of this newer technique is that it allows us to make these inferences about a population even when analytic solutions are not possible or when assumptions are weak (Camerer, 1981). Previous research has outlined additional advantages of bootstrapping such as how it allows us to be able to deal with violations of assumptions of the more traditional methods, it is valid for small samples, it is sufficient for testing complicated functions of parameters, and it does not require strong assumptions (Dogan, 2007; Camerer, 1981).

This study sought to address the gap in research of how reflection and brooding mediate the relationship between anxiety and depression. Although past research has revealed a link between rumination and the comorbidity of anxiety and depression symptoms, more research is needed to identify how subtypes of rumination facilitate this comorbidity and explain this relationship. This may be useful in aiding clinical work to better understand the comorbidity of anxiety symptoms and depressive symptoms, and how these subtypes of rumination explain this relationship. We hypothesized that rumination would mediate the relationship between depression and anxiety, and that each subfactor, reflection and brooding, would also independently mediate the relationship between anxiety and depression.

Methods

Participants

The sample for the current study consisted of 375 students at a large Midwestern University. Participants had a mean age of 19 years, ranging from 18-40. They were primarily female (67%) compared to males (33%). The sample was mostly Caucasian (84%), with other various ethnicities including African American (4%), Latino/Hispanic (2%), Middle Eastern (.5%), Asian American (4%), and other (.5%).

Procedure

All procedures in the current study were approved by the university's Institutional Review Board. After reading and agreeing to a consent form, participants completed an online questionnaire through Qualtrics via SONA and received course credit in exchange for their participation. Demographic information was collected from each participant using an online survey including sex, age, religious affiliation, ethnicity, and year in school. Participants completed various questionnaires for trait constructs including depression (CES-D), anxiety (SAS), and repetitive negative thought processes (RRS).

Center for Epidemiological Studies Scale for Depression (CES-D; Radloff, 1977). The CES-D is a 20-item measure that assesses frequency of depressive symptoms. Responses range from 0 (Rarely/less than 1 day) to 3 (Most of the time/5-7 days). In the present study, Cronbach's alpha was moderate, (α=.71).

Zung Self-Rating Anxiety Scale (SAS; Zung, W.W., 1971). The SAS is a 20-item self-report measure of anxiety level. Items are scored on a Likert-type scale from 1 (Little/none of the time) to 4 (Most/all of the time) with higher score indicating higher levels of anxiety. The SAS had moderate internal consistency in the present study (α=.74).

Ruminative Response Scale (RRS; Nolen-Hoeksema & Marrow, 1991; Treynor, Gonzalez, & Nolen-Hoeksema, 2003). The RRS is a 10-item measure that assesses repetitive

negative thought related to depressive symptoms, specifically rumination. This measure uses two factors: A Reflection factor ("Write down what you are thinking and analyze it"), which assesses the degree to which participants attempt to problem-solve current symptoms, and a Brooding factor ("Think 'What am I doing to deserve this?'"), which assesses the degree to which participants engage in negative thoughts about their symptoms. Internal consistency for the Reflection subscale in the RRS was good in the current study, (α=.82). Additionally, internal consistency for the Brooding subscale was good, (α=.84). Overall, internal consistency for the RRS in the current study was high, (α=.89).

Results

The present study utilized the Process Macro (Hayes, 2012) in order to estimate the mediation analysis. Bootstrapping with 1000 resamples was used to determine the role of two subtypes of rumination on the relation between anxiety symptoms and depressive symptoms.

It was found that anxiety symptoms were positively associated with depressive symptoms (β = .79, t(373) = 20.41, p = .001; see Figure 1). Additionally, anxiety symptoms were positively associated with reflection (β = .18, t(373) = 9.80, p = .001) and brooding (β = .22, t(373) = 12.83, p = .001). Results also indicated that each mediator was positively related to depressive symptoms, such that an increase in reflection was associated with an increase in depressive symptoms, (β = .42, t(373) = 3.19, p = .002), and brooding was also associated with an increase in depressive symptoms,(β = .57, -(373) = 4.08, p = .001).

Results of the analysis confirmed the mediating roles of reflection and brooding in the relation between anxiety and depressive symptoms (Effect= .80; 95% CI [.71, .87], p = .001). Results also indicated that the direct effect of anxiety on depressive symptoms was significant when controlling for reflection and brooding (Effect= .59, 95% CI [.50, .67], p = .001).

Discussion

The purpose of this study was to investigate the factors of reflection and brooding and how these subcomponents relate to the comorbidity of anxiety and depression. An abundance of previous research over the comorbidity of anxiety and depressive symptoms was supported in our study, as the present study suggests that there is a significant direct relationship between anxiety and depression, such that an increase in anxiety resulted in increased depressive symptoms. In regards to repetitive negative thinking and rumination, most of the prior research on rumination in the comorbidity of anxiety and depression has not included the factor of reflection. However, the current study investigated the role of reflection and brooding independently of one another in the comorbidity of anxiety and depression, along with examining rumination as a whole in the relation between anxiety and depression. We found that anxiety had an indirect effect on depression through reflection and brooding, suggesting a significant mediated relationship. Each mediator independent of one another, reflection and brooding, was positively related to depressive symptoms. This suggests that an increase in reflection was associated with an increase in depressive symptoms, and an increase in brooding was also associated with an increase in depressive symptoms.

The direct effect of anxiety on depressive symptoms was also significant when controlling for rumination, indicating there may be other mediators involved and further research is needed. It is important to learn about other transdiagnostic factors and other possible mediators such as worry, anticipation, and problems with executive functioning to allow us to diagnose across a wider population and clinical population. This suggests that the comorbidity between anxiety and depression is explained in part through rumination facets.

These results also have implications for theories of depression and comorbidity. Specifically, Nolen-Hoeksema (e.g., 1987) has hypothesized that excessive focusing on the causes and consequences of one's depression increase risk for developing further depressive symptoms. These results suggest that rumination may be one mechanism that is involved in the development of the depression and comorbidity. Reflective rumination and brooding rumination may both play an important role in this comorbidity of psychopathology, as reflective rumination involves the individual looking inward to problem solve in order to decrease depressive symptoms while brooding adds a negative aspect on to it. Therefore, future research should incorporate both reflective rumination and brooding rumination into future studies in order to evaluate why reflection may also have maladaptive effects on depression and comorbidity. Furthermore, Starr and Stroud indicate that many risk factors for depression are associated with anxiety symptoms as well, and may account for the high comorbidity levels between these two disorders. The results from the current study support this framework, indicating the important role that anxiety symptoms play over time in the development of depressive symptoms. The relationship between the comorbidity of anxiety symptoms and depressive symptoms suggests that multiple points of intervention may be important in aiding individuals with this maladaptive process.

Limitations of this study include that our sample consisted of mainly college undergraduates, therefore there was not a vast range of age or other demographic variables. Future studies should sample a population of a larger age range and more diverse characteristics in order to best represent clinical populations and the overall population. Another limitation is that all measures were assessed using self-report. Future studies should evaluate similar questions using additional methodologies, such as interviewer-rated measures or using

observations of participant's psychological and emotional responses. Finally, the current study used a cross-sectional design. This limits the conclusions that can be drawn regarding temporal ordering of the variables. Future research should use a prospective design in order decrease potential sources of bias and confounding as this will aid in making precise estimates of the outcome.

Limitations aside, the current study represents an important step in further understanding the role of reflection and brooding in psychopathology in general. This suggests that reflection is an important factor in the comorbidity of anxiety and depression, and future research should include this subcomponent more frequently. As such, these subtypes of rumination are an important point of intervention within this population. This is important in clinical interventions in individuals that may have depressive or anxiety symptoms.

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Figure 1. Mediation Model